General Ergonomic Guidelines for Laboratory Work

Sources of stress and strain

Hands are a laboratory worker's most important tool. As laboratory work primarily involves working with the hands, the risk of hand and upper limb stress injuries is especially high. For example, repeated pipetting tasks at a fast pace can result in static muscle tension, a situation in which muscles do not have time to relax between motions. This increases the risk of strain injuries such as tendonitis and muscle pain. Tired, painful or inflamed muscles are a clear indication of excess strain.

Ease your repetitive tasks – eliminate unnecessary motions and put both hands to work

When performing repetitive tasks it is important to consider the following points:

- Plan for breaks and the order of tasks in advance
- Vary duties at least for the toughest jobs
- Use both hands (e.g. if you are right handed use your left hand with mixers, multichannel rinsing, battery-operated dispensers and your computer mouse)
- Pay attention to how you work: avoid holding things too tightly
- Work with lighter pipettes or dispensers
- Use Micro tubes with lids that are easy to open and close
- Try to avoid straining the thumb and forefinger

Improve your working methods Joint positions

Upper arm, elbow and wrist motions are common to laboratory work. Always try to keep your joints in natural positions. If the joint motions are excessively frequent (e.g. circular wrist motions), this can lead to joint pain, articular facet damage and even degenerative arthritis.

Wrist angles

Avoid bending your wrist. If the hand is extended too far forward or sideways from your body, undue stress is placed on upper arm joint tissues and the risk of injury increases.

Pay attention to upper arm, forearm and wrist positions

Avoid bending your wrist and performing tasks with raised arms. Fasten lids carefully and take as good a hold of the lid as possible, also try to use your left hand. Fastening lids with a circular motion results in poor wrist angles and strains the wrist joint.

Shake bottles in an up-and-down motion so that your joints use a natural motion. Circular forearm motion puts a burden on the wrist and nearby joints.

Try to avoid raising your hand during pipetting, if you must then use a support for your arm. Raised upper arms strain upper arm joints and inhibit upper arm joint metabolism.

Save your joints – favour natural movements and support your hands

To reduce strain on joints, take note of the following:

Try to keep your upper arms close to your body or use the table surface to support your elbow or forearm whenever possible. If the task requires raising your forearm, use or build a support

- **Ensure that you are close enough to your work**
- **Try to prevent your elbow from stretching forward**
- **Try to eliminate circular forearm motion**
- **Try to keep your joints in favourable positions**
- **Keep your upper arm as close to your body as possible or use a support for your arm**

What makes a good work environment?

It is important to assess the functionality of your work environment at regular intervals. The table below lists the key risks involved and recommendations for their prevention.

Environmental factor	Risk	Recommendation
Work surfaces	Too low -> Stooped neck and shoulders.	
	Too high -> Tension of shoulder and upper arms.	Work levels should be easily adjustable to task at hand or there should be access to surfaces of varied heights.
Leg room	Lack of leg space -> you cannot get close enough to task, crouching and twisting back.	Work points must have enough leg space (not to be used for storage). This also pertains to fume cupboards and laminars.
Chairs	Adjustments broken, unpadded seats -> Difficult to sit.	Chairs must be flexibly adjustable to pre-set positions.
Tools	Unserviced tool (e.g. pipette) -> The pipette is stiffer. Tools unsuited to task (e.g. a mechanical pipette for substantial pipetting)-> Too much strain on hands and forearm muscles and joints.	Tools must be serviced regularly. Acquire an electronic pipette if you do a lot of pipetting (especially multichannel pipetting).
Working area	Task too far away -> Too much reaching out, unnatural working position.	The main working area must be directly in front of you. Sit or stand as close to task as possible.
Lighting	With insufficient or wrongly directed lighting, you need to bend closer to your task. -> Crouched posture, tires your eyes.	The recommended lighting in precision work (e.g. pipetting) is 750-1,000 lux and in interface work 300-500 lux. Ask your occupational health service to assess light intensity if necessary.
Local coldness and draft	Muscle tension and reduced blood circulation.	The recommendation for light work is 19-23°C.

Acknowledgement

This advice is based on recommendations given by the Centre for Occupational Health, Finland.

Examples of good working methods

Pipetting while sitting

- Rest elbow on table (or separate support).
- Avoid bending your wrist.

Pipetting while standing

- Lower your work surface if needed (e.g. with measurement and full pipettes).

Mixing

- Keep mixer close to you and support elbow or whole forearm on table.
- When possible use your left hand

Fume cupboard and laminar flow cabinet work

- Fume cupboards and laminar flow cabinets must provide leg room and be slanted.
- Sit as close to task as possible.

Working with microscopes

-When working with a microscope, support your elbows and avoid bending the wrists. In ergonomic models the adjusters are placed low and the oculars can be adjusted for angle and depth.

Computer work

- Support elbows on table or arm rests. Set the screen 15-20 cm below eye level.
- Use left hand with the mouse.